VIKING LAB

USER'S GUIDE

MODEL: HV10

PART NO. : CS16-117

Hipotronics inc.

applied high voltage technology for industry utilities & science

MP MASTER

MA35120

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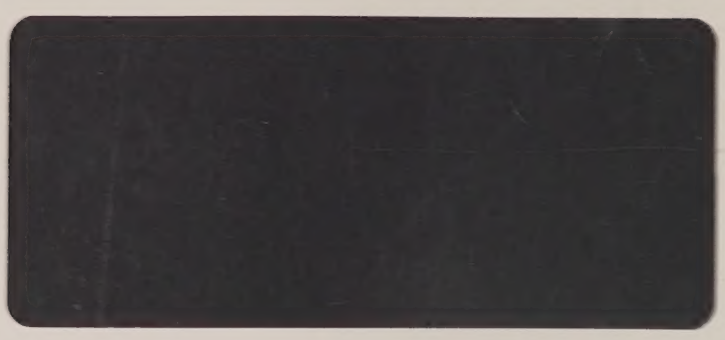

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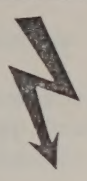
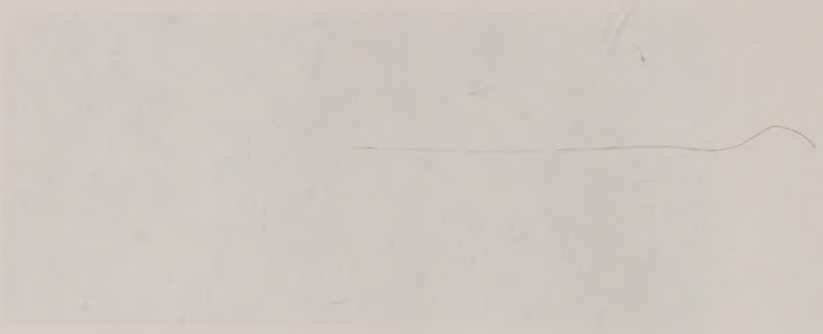


DANGER HIGH VOLTAGE

WARNING: This publication describes a product engineered and designed to supply HIGH VOLTAGE. Accordingly, maximum safeguards have been built into the equipment and the best safety techniques possible are set forth in the unit's operating instructions. These instructions contain cautions, warning the user to exercise great care in the use of certain controls and at appropriate points in the operating procedures. Despite these written warnings the operator of this equipment is nevertheless strongly advised to maintain a safety consciousness at all times. The following rules are particularly relevant and must be followed at all times.

BEFORE CONNECTING INPUT POWER, GROUND CASE.

BEFORE UNGROUNDING CASE, DISCONNECT POWER.



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SCOPE

This publication describes the HIPOTRONICS HV Series of Megohmmeters. It is intended to provide a simplified reference for users of this equipment, and to allow them to make use of its features quickly, safely, and efficiently.

Information in the body of this publication applies to all three models in the HV Series. Information pertinent to the specific model purchased is provided in the pocket of the back cover of the publication. This includes a diagram of a PCB Assembly, an electrical schematic and a Parts List.

This publication contains four major sections: General Description, Installation Instructions, Operation Instructions and Special Operations.

The General Description section describes the major features of the models in the HV Series, and also contains a description of the functions performed by each of the controls and indicators on the control panel.

The Installation Instructions section provides step-by-step instructions for installation or setup of the unit.

The Operation Instructions section provides step-by-step instructions for performing Insulation Resistance Testing.

The Special Operations section describes the procedures involved in Meter Recalibration and trouble-shooting.

REFERENCES

It is assumed that the user has a basic understanding of the handling of electrical equipment and the major function to be performed by the equimpent to be used. An outline of the functions, features and specifications of the HIPOTRONICS HV Series of Megohmmeters is provided in HIPOTRONICS Brochure HP7101. Valuable information is also contained in the American Society for Testing Materials (ASTM) standards and specifications D257.

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GENERAL DESCRIPTION

This section is intended to acquaint the user with the major features of the models in the HIPOTRONICS HV Series, and the functions performed by each of the controls and indicators on the control panel.

FEATURES AND SPECIFICATIONS

The HIPOTRONICS HV Series consist of four high voltage megohmmeters: HV2.5, HV5, HV10 and HV15. Engineered for safety and precision, these rugged, lightweight units are easy to use, fully instrumented, insulation resistance testers.

These units are particularly suited for industrial and field maintenance use such as switch gears, circuit breakers, insulated cables and other one-side grounded specimens, as well as ungrounded specimens such as boom trucks and transformer windings.

All models in the HV Series are designed for maximum equipment and operator protection. Surge devices built into the equipment preclude injury to any component from repeated short circuits at full output.

MODELS NO.	OUTPUT VOLTAGE	MEGOHM RANGE	RANGE SWITCH
HV 2.5	0-2,500 VOLTS	0.1 TO 50,000	X.01,X.1,X1,X10
HV 5	0-5,000 VOLTS	0.1 TO 100,000	X.1,X1,X10,X100
HV 10	0-10,000 VOLTS	0.1 TO 200,000	X.1,X1,X10,X100
HV 15	0-15,000 VOLTS	0.1 TO 300,000	X.1,X1,X10,X100

FIGURE 1 Specifications of Models in the HV Series
Tolerance on readings are ± 2% F.S.

All models operate from an input of 115 Volts ac, 50/60 Hz, 3 amp: rated output current is 5 mA.

Features include:

- A single-range voltmeter with a direct connection across the output.
- A single-range megohmmeter scale with four-range multiplier switch.
- An insulated return and guard circuit.
- An adjustable voltage control.
- A PUSH TO TEST button with shorting position and discharge resistor.
- An input switch, pilot light and internal HV fuse.

The formica cabinet has a front storage section which houses a return lead, a three-pronged input power cord and a shielded, high voltage cable with an alligator clamp.

CONTROLS AND INDICATORS

A diagram of the Control Panel for your particular model in the HV Series is contained in the pocket at the back of this publication. This diagram should be referred to when following the installation and operating instructions. The functions and uses of the various controls and indicators are described below.

VOLTMETER AND CONTROLS

The voltmeter is located in the lower window on the control panel, and measures the dc output voltage in kilovolts, as indicated on the scale. The numbers above the meter markings indicate the kilovolt output. The numbers below the meter markings indicate the megohmmeter multipliers. The voltmeter indicator should be at zero when the unit is off. Minor adjustments may be made only when the HV control is OFF via the adjusting screw below the meter window.

The RAISE VOLTAGE control is located to the right of the voltmeter and is used to regulate the output voltage. Markings on the RAISE VOLTAGE control denote the percentage of the unit's maximum output voltage to which the voltage may be increased.

The user is cautioned to keep the RAISE VOLTAGE control set on zero when not in use, and to lower the control back to zero immediately upon completion of a test.

MEGOHMMETER

The megohmmeter is located in the upper window on the control panel and is used to measure resistance in megohms as indicated on the scale.

The meter markings above the scale indicate resistance from 1-100 megohms, the specific range indication depending on the setting of the multiplier scale.

The multiplier control allows for resistance readings in four ranges when performing insulation testing. To obtain the proper reading from the megohmmeter, simply multiply the reading on the scale by the value indicator at the range to which the multiplier is set. The result when multiplied by the bottom reading of the voltmeter scale will give the total resistance of the sample in megohms.

Example: In performing an insulation resistance test, the megohmmeter indication is "4" on the megohm scale, with the MULTIPLIER control set at "X100". The proper reading is therefore 400 megohms. The lower scale on the voltmeter is 2.5 so the final reading is 2.5 x 400 or 1,000 megohms.

The megohmmeter indicator should be at zero when the unit is OFF. If not, minor adjustments may be made only when the HV control is OFF via the adjusting screw below the meter window.

SETTING	VALUE
X.1	.1
X1	1
X10	10
$X10^2$	100

AC POWER CONTROLS

The AC POWER section of the control panel contains a toggle switch (labeled ON at the upper position) for the unit, a pilot light that glows when the unit is ON and an internal HV fuse. The fuse may be accessed for replacement by removing the front panel after the unit is turned off.

GUARD - GROUND - POSITIVE FRONT PANEL CONNECTIONS

There are three plug-in connection posts on the front panel labeled GUARD, GROUND, and POSITIVE. The GUARD or POS posts are always connected to GROUND by a jumper link whenever testing. An explanation of these two connection combinations follows:

1 - Jumper link connected between GUARD and GROUND posts
(Refer to sketches 1 & 2, pages 5 & 6)

The test setup for a guarded measurement on a sample of insulating material is shown in Figure 1. The resistance of the material between the high voltage electrode and the low voltage electrode is directly proportional to the applied voltage and inversely proportional to the resultant current flow. The voltage The voltage stress on the insulation is affected by fringing at its edges resulting in two types of leakage current flowing. With a grounded GUARD hookup, all leakage current flowing directly to ground will be bypassed around the current meter and therefore not observed. Only leakage current flowing along the insulator will be observed and accurately measured by the current meter.

2. Jumper link connected between GROUND and the POS posts

This front panel hookup connection will only be used when sensitive leakage current measurements are not necessary or when only flashover tests to ground are required. The leakage current paths are not separated in this configuration so therefore all leakage current is observed on the current meter.

NEGATIVE POST

The NEGATIVE post is located in the lower right of the control panel. It provides the high voltage to the test sample.

HIGH VOLTAGE CONTROLS

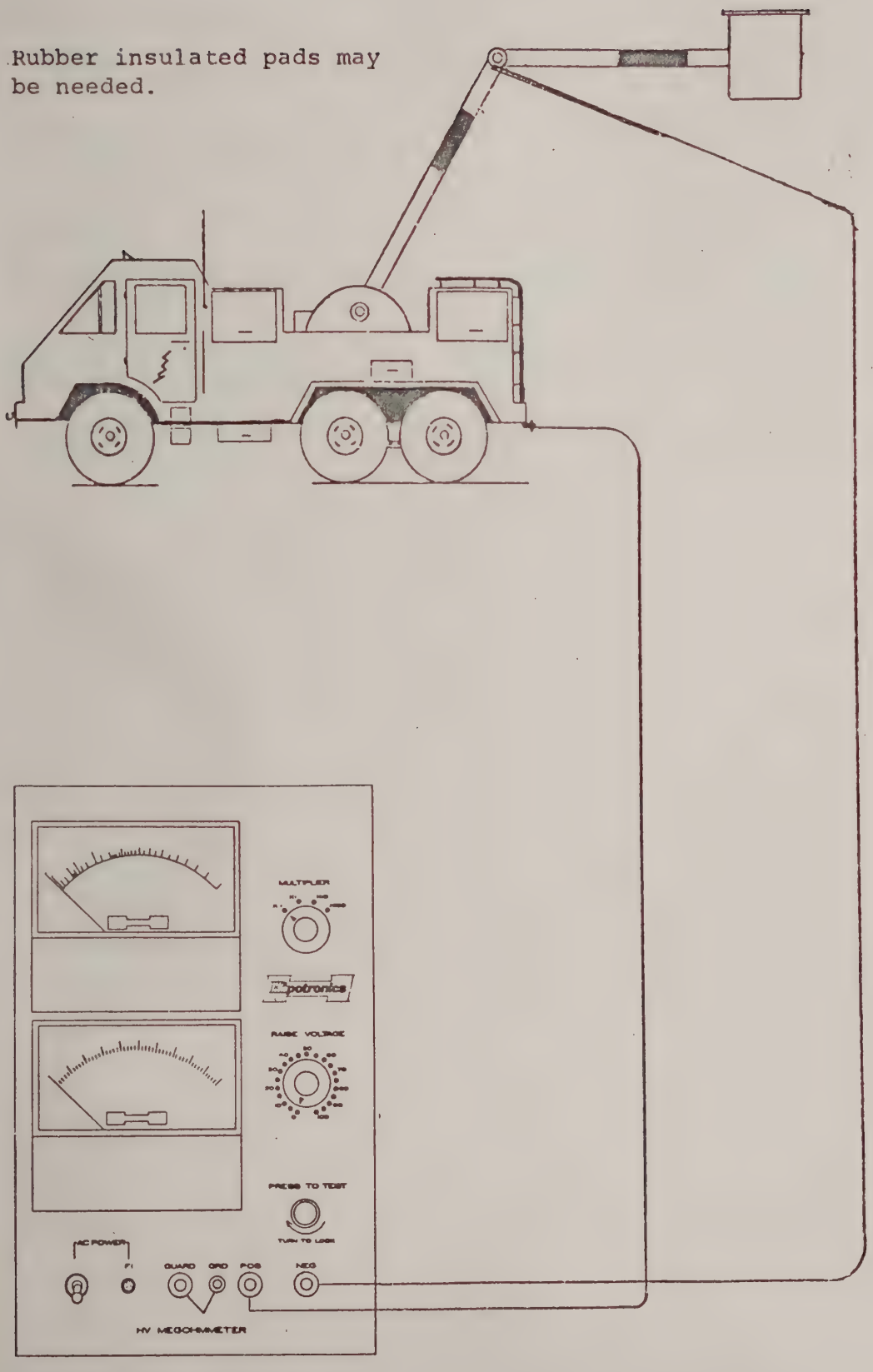
The HIGH VOLTAGE control, located below the lower right corner of the voltmeter window, has a PUSH TO TEST button which must be depressed before output voltage may be applied. For long tests, the PUSH TO TEST switch can be locked in by pushing in and turning a slight turn to the right.

The pilot light to the right of the AC POWER switch glows when the ac power is ON.

* Rubber insulated pads may be needed.

Sketch #1 - Test on the upper arm of a single insulated boom truck (control unit should be grounded).

* Rubber insulated pads may be needed.



Sketch #2 - Flashover test on the lower insulated arm of a double insulated boom truck (control panel should be grounded.)

INSTALLATION INSTRUCTIONS

This section provides step-by-step instructions for the installation or setup of the HV Series Megohmmeters.

1. Select a location for the unit that will place the meters at eye level to allow for maximum accuracy in readings.

2. Set the RAISE VOLTAGE control to zero, and check to ensure that the AC POWER switch is in the OFF (down) position.

3. Ground the case before connecting the input power. The GROUND post on the control panel may be used for this purpose.

4. Plug the line cord into 115 volts, 50/60 Hz outlet. If a two-prong adapter is used, be sure to ground the third wire.

5. Turn the AC POWER switch ON (up position). Depress the PRESS TO TEST button to commence the test.

OPERATION INSTRUCTIONS

This section provides step-by-step instructions for performing insulation resistance testing. Prior to performing any of these functions, the procedures described in the preceding section must be performed.

RESISTANCE TESTING

1. Plug the line cord into a three wire grounded type receptacle. (For a 115 V ac plug, plug a three-prong plug into a three-prong adapter; for a 220 V plug, connect the green wire to the ground, the white wire to the B line, the black wire to the A line.)

2. Connect the red test lead to the POS terminal, and the shielded black test lead to the NEG re-entry bushing.

3. Connect the GROUND strap the GUARD terminal if the specimen under test is isolated from ground. Connect the GROUND strap to the POS terminal if the specimen under test is <u>not</u> isolated from ground. Red test lead will act as a return in this case.

4. Connect the black and red test clips to the specimen under test. (Red clip to high side, black to low side.)

5. Turn the AC POWER switch on. Check that the AC POWER ON indicator lights.

6. Select the lowest range on the MULTIPLIER switch (X.1) to start. (The range must be increased step-by-step, until the desired range is reached, to protect meter movement.)

7. Depress the PUSH TO TEST button.

8. Adjust the RAISE VOLTAGE control until the desired voltage level is indicated on the kilovolt meter.

9. Select the proper MULTIPLIER range.

10. Record the resistance reading as indicated on the meter.

    To obtain the correct resistance value, the megohm reading must be multiplied by the correct factor as indicated on the kilovoltmeter.

11. Always release the PUSH TO TEST pushbutton switch so that the test sample is shorted to ground for operator safety.

12. Turn the AC POWER switch OFF. Note that AC POWER indicator goes out.

13. Disconnect the test leads from the specimen under test.

SPECIAL OPERATIONS

This section describes the step-by-step procedures required to perform special operations incidental to the major functions described in the preceding section.

METER RECALIBRATION

Meters on HIPOTRONICS HV Series have been calibrated with standards traceable to national standards maintained by the National Bureau of Standards in Washington, DC, and have certified accuracy within 2% when shipped. The megohmmeter scales should be periodically checked against a standard resistor of a known value. (See trouble-shooting section for further details.)

Meter recalibration should be performed by the user as often as necessary to meet the requirements of each particular installations, as dictated by usage and by the user's standards for accuracy. Considering these requirements, how frequently meter recalibration should be performed depends primarily on three factors: amount of physical handling, time lapse, and extent of meter usage. Intervals between meter recalibration may vary anywhere between one month and one year.

The process of meter recalibration consists of two separate operations to be performed in the sequence described:

1. Setup procedures
2. Voltmeter Calibration - DC

SETUP PROCEDURES

1. Remove the plug on the right side of the cabinet to gain access to the meter calibration pot.

2. Select a location for the unit that will place the meters at eye level to allow for maximum accuracy in the readings.

3. Set the RAISE VOLTAGE control to zero, and check to ensure that the AC POWER switch is in the OFF (down) position.

4. Ground the case before connecting the input power. A GROUND Post on the control panel may be used for this purpose.

5. Plug the line cord of unit into 115 V, 50/60 Hz outlet. If a two-prong adapter is used, be sure to ground the third wire. (120 V, 50 Hz outlet may also be used.)

VOLTMETER CALIBRATION - DC

1. Ensure that the unit is properly grounded and that the RAISE VOLTAGE control is set at zero.

2. Connect the output lead from the negative terminal to the HV end of the standard meter.

3. Connect the low side of the standard meter to ground.

4. Depress the PRESS TO TEST button.

5. Increase the output voltage via the RAISE VOLTAGE control until the external voltmeter reading is equivalent to two-thirds of the scale of the meter to be calibrated (unit meter).

6. If there is a discrepancy between the voltmeter reading and the standard meter reading, adjust with calibration pot.

7. Release the PRESS TO TEST button.

8. Turn off the unit and replace cap in calibration pot location.

TROUBLE SHOOTING

All products shipped by HIPOTRONICS are thoroughly tested against a rigid set of standards by the firm's Quality Control Department. In the event a unit appears not to function upon delivery, the user is referred to the section, "RETURNED MATERIAL".

This section of the publication is intended to aid the user in locating the source of a problem when a unit is either not functioning or functioning improperly.

Use of these procedures is at the user's own risk. It is not recommended that these procedures be used while the equipment is under Warranty, as some of the recommended steps involve the removal, testing or disconnecting of components, which could result in voiding the Warranty.

These procedures are intended for use only by a trained repair technician, and are not recommended for use by individuals trained only to operate the equipment, except under strict supervision.

An attempt has been made to provide information to aid the user in trouble-shooting those problems that are most commonly encountered, either as a result of normal wear and tear or direct damage to the unit. Trouble-shooting procedures are described in tabular form on the next page for ease in reference. Procedures are listed according to problem area. Possible causes of each problem are listed, along with appropriate remedial action for each case.

ABLE 1 TROUBLE-SHOOTING GUIDE

PROBLEM	POSSIBLE CAUSE	RECOMMENDED ACTION
NO HIGH VOLTAGE OUTPUT	A. Fuse has blown. B. No connection in the HV PRESS TO TEST switch (S2). C. Low input voltage. D. R1 resistor damaged. E. T2 Variac damaged.	A. Replace F1 fuse located inside of unit. B. Loosen nut at the end of the bushing and tighten set screw. C. Check power source for input voltage (Minimum line voltage is 80%) D. Check for an open 250 k ohms R1 resistor. Replace if needed. E. Check output of component with external voltmeter; replace if necessary.
HIGH VOLTAGE SHOCK	A. Bad Ground B. Faulty PRESS TO TEST switch.	A. Ground unit and independent power source. B. Turn PRESS TO TEST knob clockwise to tighten brass ball inside switch. HV should short to Ground when switch is released.
ERRATIC GH VOLTAGE OUTPUT	A. Variac brushes are dirty or worn.	A. Clean or replace Variac brushes.
INCORRECT VOLTMETER READING	A. Excessive use or vibration	A. Recalibrate to a Standard Meter.
INCORRECT MEGOHM READING	A. Calibration off	A. Check voltage calibration against Standard Meter. Calibrate with R6 if necessary.

RETURNED MATERIAL

If, for any reason, it should become necessary to return the equipment described in this publication to the factory, the Warranty Service Department of Hipotronics must be contacted, at which time the following data must be given in order that we may identify the unit and determine the necessity for return. (Tel. (914) 279-8091) MODEL, SERIAL NO. and TYPE (Part No) is indicated on the black and silver tag affixed to the unit.

MODEL:
SERIAL NUMBER:
TYPE (Part No):
REASON FOR RETURN:
DEFECT:
ALLEGED CAUSE OF DEFECT:

If Hipotronics deems return of the unit appropriate, an "Authorization for Return" tag will be issued. This will instruct you as to the method of return. The pink copy is for your records, the hard copy to be affixed to the unit being returned. If return is not deemed advisable, other inspection arrangements will be made.

NOTE: Material received at this point without the proper authorization shall be held as "customer's property," with no service performed until such time as the proper steps have been taken.

Your cooperation is requested in order to ensure prompt service. Thank you.

PARTS ORDERING

To order replacement parts of this unit, please refer to the Parts List contained in the pocket of this publication. The number of the specific component is required, along with the TYPE (Part No) of the unit. The TYPE (Part No) is indicated on your Parts List, and on the black and silver tag affixed to the unit.

WARRANTY

HIPOTRONICS, INC. warrants to the orginal purchaser of any new merchandise that the merchandise is free from defects in material and workmanship under normal use and service for a period of one year from the date of shipment. The obligation of HIPOTRONICS, INC. under this Warranty is limited, in its exclusive option, to repair, replace or issue credit for parts or materials which prove to be defective, and is subject to Purchaser's compliance with the HIPOTRONICS, INC. Warranty Claim Procedure as set forth below. The happening of any one or more of the following events will serve to void this Warranty and any defect or damage resulting therefrom is specifically excluded for Warranty coverage: (a) defects due to accident, negligence, alteration, modification, faulty installation by Purchaser or Purchaser's agents or employee, abuse or misuse; (b) attempted or actual dismantling, disassembling, service or repair by any person, firm or corporation not specifically authorized in writing by HIPOTRONICS, INC. (c) defects caused by or due to handling by carrier, or incurred during shipment, transshipment or other move.

This Warranty covers only those parts and/or materials deemed by HIPOTRONICS, INC. to be defective within the meaning of this Warranty. The liability of HIPOTRONICS, INC. shall be limited to the repair, replacement or issuance of credit for parts deemed defective within the meaning of this Warranty. Costs incurred by purchaser for labor or other expenses incidental to the inspection, repair, replacement or issuance of credit for such parts and/or material shall be the sole responsibility of purchaser. This Warranty shall not apply to any accessories, parts, or materials not manufactured or supplied by HIPOTRONICS, INC. and if, in the sole discretion of HIPOTRONICS, INC., Purchaser's claim relates to any materials or workmanship manufactured or performed by the supplier of a component part, or of the manufacturer of a device of which the defective part is a component, HIPOTRONICS, INC. reserves the right to disclaim liability under this Warranty and to direct that the Purchaser deal directly with such supplier or manufacturer. HIPOTRONICS, INC. agrees to assist the Purchaser in processing or settling any such claim without prejudicing its position as to liability.

WARRANTY CLAIM PROCEDURE

Compliance with the following Warranty claim Procedure is a condition precedent to the obligation of HIPOTRONICS, INC. under this Warranty:

a) Purchaser must notify HIPOTRONICS, INC. in writing by certified or registered mail, of the defect claimed within twelve months after date of original shipment. Said notice shall describe in detail the defect, the defective part, and the alleged cause of defect.

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